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## Wavelength Dependent In-Situ Neutron Radiography Investigations of the Phase Change of Zirconium Oxide and Zirconium Nitride during Air Oxidation

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Oxygen stabilized metallic zirconium ( $Zr(O)$ ) reacts with  $N_2$  at temperatures between 700 and 1400°C. Post-test examinations at room temperature, however, show a mixed structure consisting of  $ZrO_2$  and  $ZrN$ . No information is available about which phases are formed during the reaction at these high temperatures. It is possible that both phases are produced directly or that a  $Zr(O,N)_x$  mixing phase is produced which decomposes into  $ZrN$  and  $ZrO_2$  during cooling down to room temperature.

Wavelength dependent neutron radiography was used to perform in-situ investigations of the phase composition of the zirconium at different temperatures. The aim was to check the presence of  $Zr(N,O)_x$  and at which temperature the two-phase mixture  $ZrO_2 / ZrN$  and the phase change in the structure of  $ZrO_2$  from tetragonal to monoclinic occur. In this presentation we discuss the background noise observed in the radiographs due to a change in furnace temperature when performing wavelength dependent in-situ neutron radiography experiments.

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